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AUTHOR Rodney, Elaine
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ABSTRACT

The validity of students' first-quarter academic performance in predicting attrition at Central State University, Ohio, was investigated. It was hypothesized that freshmen who performed satisfactorily during the first quarter were more likely to complete their baccalaureate programs than were those who performed less well. Data on 287 students were collected on grade point average (GPA) and grades in English and mathematics. It was found that approximately 51 percent of entering freshmen in the 1976 class dropped out before graduation. GPA was the single most significant predictor of attrition, accounting for about 24 percent of the variance. Inclusion of students' first-quarter English grade further increased the accuracy of prediction by two percent. It is concluded that GPA and English grade for the first quarter can be used to predict fairly accurately whether Central State University students are likely to persist until graduation. (SW)

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FIRST-QUARTER ACADEMIC PERFORMANCE

INDICATORS AS PREDICTORS OF COLLEGE ATTRITION: A STUDY OF THE 1976 - 1980 CLASS AT CENTRAL STATE UNIVERSITY

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The problem of college student attrition has been studied by several scholars over the past six decades. Iffert (1957), Summerskill (1962), and Astin (1975) are generally regarded as the scholars who have conducted the most comprehensive studies on student attrition in U.S. colleges.

The national dropout rate, as measured by the number of students lost over a four-year period, appears to have changed very little since 1913, when the first study was conducted. Summerskill's review of attrition studies between 1913 and 1953 reveals that the median loss was 50%, while the median of the graduating classes four years later was 37%. These findings support those of Iffert (1957): (a) 50% of the entering class will be lost to the average college by the end of four years, (b) only 40% of the entering class will graduate from the college four years later, (c) the remaining 10% will graduate from that college after four years, and (d) 20% of the lost students will graduate from other institutions eventually (Pantages and Creedon, 1978).

Academic Factors Associated with Attrition

Several studies have established that GPA and high school rank can be used to differentiate between potential dropouts and persisters. Pantages and Creedon report that Astin's study of 1973 (b) ascertained that the probability of getting a B.A. in four years will increase by 70% if the student has a high school GPA $\leq$ 3.5. Other researchers feel that there is no significant

difference in high school GPA or class rank between dropouts and nondropouts.

The present study is an attempt to determine the predictive validity of students' first-quarter academic performance with respect to college students' attrition at Central State University. It was hypothesized that students who performed satisfactorily during the first quarter of their undergraduate college program were more likely to complete their baccalaureate degree programs at Central State University than were their peers who performed less well.

METHOD

Subjects

Two hundred and eighty seven students (N=287) enrolled at Central State University in Autumn Quarter 1976 who completed their first quarter of course work at this university and for whom complete data were available, constituted the sample for the study.

Procedures

Student academic performance data and college attrition status (dropout vs. nondropout) were obtained from college records.

Academic performance was measured by the following first-quarter academic indicators:

(i) Grade-point average (GPA)
(ii) English Grade
(iii) Mathematics Grade

English and Mathematics grades were used as all enrolled freshmen were required to take courses in these content areas during their first quarter at Central State. Students' grade-point average provides a measure of the students' cumulative performance across all course work during the time period under investigation.

English and Mathematics grades were converted to the following numeric scale:

A=5, B=4, C=3, D=2, E=1

Grade-point average ranged in value from 00 - 4.00

College attrition referred to students who withdrew from Central State University (CSU) voluntarily or through academic dismissals prior to the successful completion of their baccaluareate degree program. The college attrition variable was measured as a dicotomous variable having the following values:

1= Enrolled freshmen of the 1976-80 class from CSU prior to graduation (Dropouts)

2= Enrolled freshmen of the 1976-80 class who completed their baccalaureate degree program at CSU (Non-Dropouts)

To determine the extent to which students' first-quarter academic performance was effective in predicting student attrition at Central State University, data were subjected to

stepwise multiple regression analysis procedures. To serve cross-validation purposes the total sample (N=287) was randomnly divided into subsamples using a 2:1 ratio. The larger subsample ($66^{2}/3$ of the total sample) was used as the derivation sample from which the college attrition prediction equation was obtained. The smaller subsample ($33^{1}/3$ of the total sample) was used as the cross-validation sample which served to provide a measure of the predictive efficiency of the prediction equation when applied to a new sample.

Variables: Students' first-quarter academic performance indicators (i) grade-point average (GPA), (ii) English grade, and (iii) Mathematics grade, constituted the predictor (independent) variables in the regression equation. College attrition status (dropout vs. non-dropout) was used as the criterion (dependent) variable.

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RESULTS

Means and standard deviations of students' first-quarter academic performance indicators for three groups: (a) total sample, (b) non-dropouts, and (c) drop-outs are presented in Tables 1, 2 and 3, respectively.

TABLE 1

MEANS AND STANDARD DEVIATIONS OF FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS: TOTAL SAMPLE
(N=287)

Performance Indicators	Mean	Standard Deviation
English	2.33	1.10
Mathematics	2.30	1.17
GPA	2.37	0.92

TABLE 2

MEANS AND STANDARD DEVIATIONS OF FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS: NONDROPOUT GROUP
(N=142)

Performance Indicator	Mean	Standard Deviation
English	2.83	0.82
Mathematics	2.80	0.93
GPA	2.81	0.81

TABLE 3

MEANS AND STANDARD DEVIATIONS OF FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS: DROPOUT GROUP

(N=145)

Performance Indicator	Mean	Standard Deviation
English	1.83	1.11
Mathematics	1.81	1.17
GPA	1.95	0.82

A comparison of the reported sample sizes of the three groups (total sample, non-dropout group and 'dropout' group) shows that approximately 51% of students enrolled in the 1976 class withdrew from Central State University before completion of their baccalaureate degree program.

As shown in Table 2 and Table 3, the mean first-quarter performance on all three measures was higher for the 'non-dropout' group than for the 'dropout' -group. Examination of the standard deviation values for each indicator across these two groups reveals a wider spread in performance levels for the dropout-group than for the non-dropout group.

Zero-order (Pearson simple r) intercorrelations among the academic performance measures for the three groups are reported in Tables 4 - 6. Inspection and comparison across these tables

reveal that although the magnitude of the correlation coefficients reported for the 'non-dropout' group was less than for the corresponding correlation coefficients reported for the total and 'dropout' groups, the relative pattern of relationships among performance indicators was nonetheless consistent and statistically significant ($p < .001$) across all three groups.

TABLE 4

ZERO-ORDER INTERCORRELATIONS AMONG FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS: TOTAL SAMPLE (N=287)

	Performance Indicator		
Performance Indicators	English	Mathematics	GPA
English	1.00		
Mathematics	0.72*	1.00	
GPA	0.77*	0.77*	1.00

*$p < .001$

TABLE 5

ZERO-ORDER INTERCORRELATIONS AMONG FIRST QUARTER ACADEMIC PERFORMANCE INDICATORS: NON-DROPOUT GROUP (N=142)

	Performance Indicator		
Performance Indicator	English	Mathematics	GPA
English	1.00		
Mathematics	0.49*	1.00	
GPA	0.58*	0.59*	1.00

*$p < .001$

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TABLE 6

ZERO-ORDER INTERCORRELATIONS AMONG FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS: DROPOUT GROUP (N=145)

Performance Indicators	Performance Indicator		
	English	Mathematics	GPA
English	1.00		
Mathematics	0.76*	1.00	
GPA	0.80*	0.82*	1.00

*$p < .001$

The Attrition Prediction Equation

To investigate the efficiency of the three academic performance indicators in predicting college attrition at Central State University, the data were subjected to stepwise multiple regression analyses employing two subsamples -- a derivation sample and a cross-validation subsample.

Descriptive statistics for the derivation and cross-validation subsamples are reported in Table 7 and Table 8, respectively. Similar data for each of these two subsamples by college attrition status (dropout vs. non-dropout) are reported in Appendix A, Tables 11-14.

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TABLE 7

MEANS AND STANDARD DEVIATIONS OF FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS BY SUBSAMPLE

Subsample	N	Performance Indicator	Mean	Standard Deviation
DERIVATION	192	English	2.30	1.13
		Mathematics	2.25	1.18
		GPA	2.34	0.93
CROSS-VALIDATION	95	English	2.30	1.04
		Mathematics	2.40	1.14
		GPA	2.46	0.89

TABLE 8

ZERO-ORDER INTERCORRELATIONS AMONG FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS AND COLLEGE ATTRITION STATUS BY SUBSAMPLE

Subsample	Variable	Variable English	Mathematics	GPA	Attrition Status
DERIVATION (N=192)	English	1.00			
	Mathematics	0.73*	1.00		
	GPA	0.77*	0.79*	1.00	
	Attrition Status	0.47*	0.45*	0.49*	1.00
CROSS-VALIDATION (N=95)	English	1.00			
	Mathematics	0.71*	1.00		
	GPA	0.75	0.74*	1.00	
	Attrition Status	0.42*	0.37*	0.42*	1.00

*$p < .001$

Inspection of Tables 7 and 8 shows the obtained statistics to be highly stable across subsamples. Strong and highly significant relationships ($p < .001$) are observed among the three academic performance measures.

The above findings also hold for data reported in Appendix A, Tables 11-14. Comparison of these data for each subsample with corresponding data presented in Tables 2-5 show the consistency of the observed pattern of relationships and measures across groups.

The relationship between student performance on each academic measure and college attrition status (dropout vs. non-dropout) over the four year period shows a moderately strong and statistically significant relationship in all instances. The reported correlation between each performance indicator and college attrition status gives a measure of the validity of each measure as a single predictor of college attrition.

The stepwise multiple regression analysis results for all three performance indicators yielded by the derivation subsample are reported in Table 9.

TABLE 9

STEPWISE MULTIPLE REGRESSION ANALYSIS OF THREE FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS ON COLLEGE ATTRITION STATUS

Performance Indicator	Unstandardized Regression Coefficient (b)	F	Cumulative R^2	Increase in R^2 per step
GPA	0.13	4.70**	0.24	0.24
English	0.09	3.74*	0.26	0.02
Mathematics	0.05	1.10	0.265	0.005
Intercept	0.87			

*$p < .06$

**$p < .05$

Examination of Table 9 reveals the relative importance of each performance indicator in predictive college attrition. As shown, students' grade-point average (GPA) is the single most significant predictor of attrition status $F(1,188) = 4.70$, $p < .05$. This variable accounted for approximately 24% ($R = .49$, $R^2 = .24$) of the variance in the criterion measure (i.e. whether enrolled freshmen at Central State University completed the undergraduate degree program at that institution or withdrew from the institution before completion of the degree program). Inclusion of students' first-quarter English grade serves to further increase the accuracy of prediction in the criterion. As shown an additional 2% of explained variance in

the criterion variable is accounted for by the unique contribution of students' English grade. This additional increase in explained variance is statistically significant $p < .02$ (See Table 10). Further examination of Table 9 reveals that the accuracy of prediction of college attrition for this sample is trivial. Thus, in terms of efficiency of prediction, only the first two variables entered in the equation, i.e. GPA and English grades, show themselves to be useful for inclusion in the prediction equation.

Table 10 reports the stepwise multiple regression analysis results when only the two predictor variables, first-quarter GPA and English grade, are included in the prediction equation.

TABLE 10

STEPWISE MULTIPLE REGRESSION ANALYSIS OF TWO FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS ON COLLEGE ATTRITION STATUS

Performance Indicators	Unstandardized Regression Coefficient (b)	F	Cumulative R^2	Increase in R^2 per step
GPA	0.16	9.86**	0.24	0.24
English	0.10	5.81*	0.26	0.02
Intercept	0.87			

*$p < .02$

*$p < .01$

Thus, approximately 26% of the variance in college attrition status is linearly accounted for by students' first-quarter grade-point average (GPA) and English grade in this derivation sample.

Employing the academic performance indicators (first-quarter GPA and English grade), the following basic regression statistics were obtained:

(1) Multiple Correlation Coefficient (R) = 0.51

(2) Coefficient of Determination[1] (R^2) = 0.26

(3) Corrected Multiple Correlation Coefficient[2]

($\tilde{R}$) = 0.50 (Skrunken R)

The resulting prediction equation for college attrition (dropout vs. non-dropout) at Central State, obtained from the derivation sample and employing the two most efficient academic performance indicators investigated, is given by:

$$Y^1 = 0.16X_1 + 0.10X_2 + 0.87$$

where

Y^1 = Predicted college attrition status

X_1 = Students' first-quarter grade-point average (GPA)

X_2 = Students' first-quarter English grade

[1]The Coefficient of Determiniation gives the percentage of variance in the criterion measures accounted for by the variance in the predictor variables (academic performance indicators)

[2]The Corrected Multiple Correlation Coefficient (Skrunken R) is the multiple correlation coefficient corrected for skrinkage. It gives an unbiased estimate of the multiple correlation coefficient in the population. The skrunken R coefficient also gives a measure of the accuracy of the prediction equation when applied to a new sample.

Cross-Validation Results

To test empirically the predictive validity of the prediction equation when employed to a new sample, the prediction equation yielded by the derivation sample was applied to the cross-validation sample. The resulting multiple correlation coefficient in the cross-validation sample was approximately 0.45 ($R = 0.45$) and was statistically significant ($p < .001$). Thus approximately 20% ($R^2 = 0.20$) of the variance in the criterion measure in the new sample can be explained by enrolled freshmen first-quarter grade-point average and English grade.

These results suggest that a fairly moderate amount of the variance in college attrition status (approximately 20% - 25%) can be reliably and validly explained by enrolled freshmen first-quarter grade-point average and English grade at Central State University.

DISCUSSION

The findings of the present study provide support for the findings reported by Iffert (1957) and Summerskill (1962) that approximately 50% of the entering class will be lost to the average college by the end of four years. In the present investigation, the results indicate that approximately 51% of entering freshmen in the 1976 class at Central State University was lost to that institution over the four year period.

The obtained prediction equation predicts somewhat accurately college attrition status at Central State University.

The obtained values for the multiple correlation coefficient corrected for skrinkage (R = 0.50) and in the empirical test of skrinkage as found in the cross-validation sample (R^c = 0.45) provide support for the claim of the stability of these measures in predictive attrition across samples. These results suggest that the two academic performance indicators first-quarter GPA and English grade, can be used to predict fairly accurately whether students are more likely to remain at Central State University through completion of their baccalaureate degree program or to withdraw from that institution before graduation.

Thus, the overall findings of the study indicate that first-quarter academic performance as measured by GPA and English grade, though by no means accounting for the larger portion of the variance in college attrition (approximately 75% of variance is still unexplained), does show itself to be one of the important correlates associated with college attrition.

These initial findings provide some information to program directors and college counselors in helping to identify potential college dropouts at Central State. To improve the predictive efficiency of the college attrition prediction equation however, further study of these and other academic performance indicators in conjunction with other non-academic factors such as student social economic status, college environmental factors and student financial aid may prove promising in future studies at Central State University and other colleges.

APPENDIX A

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TABLE 11

MEANS AND STANDARD DEVIATION OF FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS FOR DERIVATION SAMPLE BY ATTRITION STATUS

Attrition Status	Performance Indicators	Mean	Standard Deviation
Dropout (N=97)	English	1.77	1.55
	Mathematics	1.72	1.18
	GPA	1.89	0.84
Non-Dropout (N=95)	English	2.83	0.81
	Mathematics	2.79	0.91
	GPA	2.79	0.79

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TABLE 12

MEANS AND STANDARD DEVIATIONS OF FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS FOR CROSS-VALIDATION SAMPLE BY ATTRITION STATUS

Attrition Status	Performance Indicators	Mean	Standard Deviations
Dropout (N=48)	English	1.96	1.03
	Mathematics	1.98	1.14
	GPA	2.09	0.75
Non-Dropout (N=47)	English	2.83	0.87
	Mathematics	2.83	0.99
	GPA	2.84	0.88

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TABLE 13

ZERO-ORDER INTERCORRELATIONS AMONG FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS FOR DERIVATION SAMPLE BY ATTRITION STATUS

Attrition Status	Performance Indicator	Performance Indicator		
		English	Mathematics	GPA
Dropout (N=97)	English	1.00		
	Mathematics	0.76*	1.00	
	GPA	0.80*	0.83*	1.00
Non-Dropout (N=95)	English	1.00		
	Mathematics	0.47*	1.00	
	GPA	0.59*	0.58*	1.00

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TABLE 14

ZERO-ORDER INTERCORRELATIONS AMONG FIRST-QUARTER ACADEMIC PERFORMANCE INDICATORS FOR CROSS-VALIDATION SAMPLE BY ATTRITION STATUS

Attrition Status	Performance Indicator	Performance Indicator		
		English	Mathematics	GPA
Dropout (N=48)	English	1.00		
	Mathematics	0.74*	1.00	
	GPA	0.79*	0.78*	1.00
Non-Dropout (N=47)	English	1.00		
	Mathematics	0.52*	1.00	
	GPA	0.63*	0.62*	1.00

BIBLIOGRAPHY

1. Astin, Alexander N. "Preventing Students from Dropping Out". San Francisco, California Jossey, Bass, 1975

2. Iffert, R.E. Retention and withdrawal of college students (Bulletin 1958, #1). Washington, D.C. US Government Printing Office, 1957

3. Pantages, Timothy J. and Creedon, Carol F. Studies of Attrition: 1950-1975 in Review of Educational Research Winter 1978, Vol. 48, No. 1 P. 49-101 Washington, D.C.: American Research Association 1978

4. Summerskill, J. Dropouts from college, in The American College, edited by N. Sanford New York: Wiley, 1962